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Journal:	*Applied Economics*
Manuscript ID:	APE-06-0803.R1
Journal Selection:	Applied Economics
Date Submitted by the Author:	24-Jul-2008
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JEL Code:	L21 - Business Objectives of the Firm < L2 - Firm Objectives, Organization, and Behavior < L - Industrial Organization, L22 - Firm Organization, Market Structure: Markets vs. Hierarchies; Vertical Integration < L2 - Firm Objectives, Organization, and Behavior < L - Industrial Organization
Keywords:	firm alliances, resource conditions, uncertainty

I. Introduction

A notable trend in recent years has been the swift growth in the intensity of firm alliance strategies[1] with a consequent proliferation in research studies on the subject. Among all the respective topics, one important question has merited particular attention from researchers: what motivates firms to enter into alliances with other firms?

The literature reveals a large number of motives for cooperative arrangements drawn from several approaches to firm behavior: transaction cost theory (Williamson, 1979), resource dependence theory (Barley *et al.*, 1992), resource-based view (Das and Teng, 2000), organizational learning (Kogut, 1988), relationship marketing (Arndt, 1979), strategic behavior theory (Kogut, 1988), and so on. Each one of these approaches stresses specific aspects of alliance motivation. Transaction cost theory focuses on cost minimization, resource dependence theory on getting the resources to survive and the resource-based view on synergy. In turn, organizational learning rests on knowledge, relationship marketing on providing superior customer value and strategic behavior theory on profit maximization.

Despite the proliferation of motives, the most cited has been the desire to reduce transaction costs. Thus, transaction cost economics has

[1] For the purposes of this paper, the expression "firm alliance strategies" designates any cooperative arrangement between independent firms that involves a level of integration between pure market exchange and full internalization, with the establishment (or otherwise) of a separate legal entity and the involvement (or otherwise) of minority investments by at least one participant firm.

become the most often mentioned approach in theoretical and empirical studies seeking to understand the drivers of alliance formation. Other points of view, namely those related to the internal resource situation of the firms and their external environment, are not yet so frequently taken into account as the transactional approach.

In this article, we analyze the impact of firm internal resources and perceived environmental uncertainty on the probability of a firm to establish an alliance. Thus, our theoretical framework is based on the resource dependence and resource-based view approaches, by one side, and on the literature about the role of environmental uncertainty on strategic alliances, by the other side.

Both the resource dependence theory and the resource-based view see firm resource conditions as prime drivers for alliance behavior: the probability of a firm entering into an alliance will be a function of the need to acquire external resources. However, according to our point of view, the first one is more adequate to explain alliances involving resource-poor firms while the latter fits better for firms that are relatively well resource-endowed. Our contribution is to show that results predicted by these two approaches should be moderated by perceived environmental uncertainty. Specifically, predictions of the resource dependence theory are more likely to occur in contexts of high perceived environmental uncertainty while the resource-based view fits better when this kind of uncertainty is not very high.

The departing point of our study is the research made by Park *et al* (2002). We take the challenge made by the authors when they suggest that future studies should consider managerial perceptions of the environment in order to better understand how firms react to environmental changes through strategic alliances. Our research and the above cited study have in common two basic assumptions: 1) alliance formation as a mechanism to adapt to environment is contingent on internal resources, and 2) resource-poor firms and resource-rich firms can react differently in the same environmental context.

However, our study differs from that of Park *et al* in a considerable number of points: a) the type of uncertainty used to explain the propensity of firms to enter into alliances; b) the expected behaviour of firms in different environmental contexts; c) the kind of firms included in the sample for empirical test purposes; and d) the achieved results.

Park *et al* (2002) consider the state of the market (stable, declining and growing) objectively measured as the sole environmental factor influencing the alliance behaviour of the firms. We don't question the appropriateness of this indicator for the purposes of the study, but the market is not the only source of uncertainty for firms. Hence, we followed the suggestion made by the authors themselves, and use several measures of perceived environmental context, that is, measures that reflect the way managers evaluate the external context of their firms. In particular, we aim to understand if different levels of perceived environmental uncertainty are

associated with different firm behaviours regarding inter-firm alliances. In our study, the level of environmental uncertainty is dependent on several external factors (subjectively evaluated by managers), including the state of the market.

Park *et al* (2002) hypothesize that resource-rich firms are more likely to settle alliances when the market demand declines or grows, suggesting a U-shaped relationship between the level of environmental uncertainty and the propensity of firms to enter into alliances. They hypothesize also that resource-poor firms are more likely to enter into alliances when the market demand grows, suggesting a direct and positive relationship between the level of environmental uncertainty and the propensity to ally for this kind of firms. Based on the resource dependence theory and the resource-based view, we argue that the above cited relationship will be negative for the resource-rich firms and positive for the resource-poor ones.

In order to empirically test their hypotheses, Park *et al* (2002) use a sample based on a sole industrial sector (semiconductor industry), recognizing that this is a limitation of their work. Additionally, they only consider start-up firms. We considered several industrial sectors as well as start-up and non-start-up firms. Hence, our study is more general, although recognizing that firm alliance behaviours can change across industries.

Finally, regarding the results, Park *et al* (2002) conclude that resource-rich firms are more active in volatile markets while resource-poor firms are more active in relatively stable markets. We conclude that

resource rich firms are more prone to settle alliances in relatively predictable environmental contexts while resource-poor ones have a higher propensity to ally in uncertain environmental contexts. However, these differences in the results will be moderated if we take into account that we use a different measure for the environmental context.

The paper is structured in two sections, in addition to this introduction and the conclusions. In section II, we conceptualize how perceived environmental uncertainty and resource conditions independently affect the propensity of firms to collaborate (model 1). Then, we let resource conditions and environmental uncertainty interact in order to obtain different resource condition impacts on the probability of firms engaging in alliances (model 2). In section III, the two models are formalized and applied to our sample in order to obtain a set of probabilities for alliance formation.

II. Theoretical framework and hypotheses

As said above, we agree with Park *et al* (2002) that alliances can be viewed as an adaptive response to changes in the environment. However, introducing environmental uncertainty as a key determinant factor of firm alliance strategies raises three important questions: *1)* what are the sources of environmental uncertainty, *2*) what type of environmental uncertainty

should we be dealing with, and *3*) what measures of environmental uncertainty (objective or perceived) are most adequate.

All these questions were already discussed by Milliken (1987), whose point of view could be summarized as follows: a) environmental uncertainty is a multidimensional concept; b) there are three types of environmental uncertainty: state uncertainty, that is, unpredictability of particular components of the environment; effect uncertainty, that is, unpredictability about the impact on the organization of particular environmental events; and response uncertainty, that is, inability to predict the consequences of a choice; and c) environmental uncertainty should be distinguished as a descriptor of the state of organizational environments, that is, as a characteristic of the environment objectively measurably, and as a descriptor of the state of a person who perceives himself/herself to be lacking critical information about the environment, that is, as a perceptual phenomenon.

Based on Milliken's (1987) classification, we deal with state uncertainty and adopt the notion of perceived environmental uncertainty, that is, the firms's perceived inability to predict something accurately. Our argument is that environmental uncertainty is perceptual in nature, that is, it is not unpredictable change *per se* that has implications on alliance decisions, but the perception of managers about the likelihood of such changes. At the same time, we consider that environmental changes have to

do with three main fields: market, external resources (technology, human resources and so on) and competition.

Many researchers have studied the effects of environmental uncertainty on firm alliance strategies (Beckman *et al*, 2004; Burgers *et al*, 1993; Dickson and Weaver, 1997; Robertson and Gatignon, 1998; Sarkar *et al*, 2001; Steensma *et al*, 2000). According to these studies, the general conclusion is that firms enter into alliances in order to attain flexibility and enable prompt reactions to changes (Child and Faulkner, 1998). The higher the level of environmental uncertainty, the greater the need a firm has to engage in collaboration with other firms. Thus, following these studies, the relationship between this factor and the propensity to alliance formation would be positive.

But the decision to ally is also contingent on the internal resource situation of the firm. The most adequate theoretical approaches to understand the role of resources in alliance formation are the resource dependence theory (Pfeffer and Nowak, 1976; Pfeffer and Salancik, 1978) and the resource-based view (Das and Teng, 2000; Dussauge and Garrette, 1999; Faulkner and De Rond, 2000). Both theories emphasize the internal resource situation of the firm as the prime driver for alliance formation. However, while the former emphasizes internal resource scarcity and the need to survive, the latter puts forward the internal resource capacities and the willingness to generate competitive advantages.

Specifically, the resource dependence theory argues that some firms cannot internally generate all the resources they need. In a resource scarce context, the need for acquiring resources generates weaknesses. A fast and efficient mechanism to overcome these weaknesses is to establish alliances (Park *et al*, 2002). Thus, cooperation is seen as a result of the desire of firms to acquire resources they lack internally but that are necessary for their survival.

Insofar as deficiencies in resources are viewed as driving forces for collaboration, alliance strategies are particularly relevant for resource-poor firms because they sharply experience resource dependency rather than any resource sufficiency (Steensma *et al*, 2000). If a firm controls all the resources it needs, the desire to enter into an alliance will be very low, that is, resource shortages foster support for alliances whilst a situation of resource self-sufficiency ensures a lesser propensity to collaboration. Compared to those resource-rich, resource-poor firms would be more motivated to enter into alliances (Burgers *et al*, 1993) so that the relationship between the probability of a firm engaging in an alliance and the resources it controls would tend to be negative according to the resource dependence theory.

The resource-based view also emphasizes the role of resources to explain inter-firm alliance strategies, but puts things in a different way. Firms are supposed to be well endowed in resources that they want to capitalize on through alliances in order to generate value and reinforce their

competitive advantage. The main argument for alliance formation is that firms try to leverage their superior resources with complementary resources owned by other firms (Stein, 1997). As a result, according to this theory, resource-rich firms would tend to be more active in creating alliances, unless they control all the needed resources.

If we combine the theoretical outcomes of both approaches, the result will be undetermined. According to the resource dependence theory, the relationship between the propensity to ally and the number of resources a firm controls would be negative, but the opposite is expected from the resource-based approach. Combining environmental uncertainty and firm resources in a model with no interaction (model 1), the hypothesis to be tested will be the following:

H1 – The probability of a firm entering into an alliance is directly and positively related to the level of environmental uncertainty it perceives and depends on the number of resources it controls.

However, our point of view is that this model is not adequate to fully explain alliance behavior. The adaptive response of firms to environment is conditioned by their internal situations, notably in terms of the resources they control, as Park *et al* (2002) also point out. Our main argument is that if we want to make full use of the explanatory power of both approaches

(resource dependence and resource-based views), we have to allow interaction between resource conditions and environmental uncertainty. The strong propensity of resource-rich (resource-poor) firms to engage in alliances predicted by the resource-based view (resource dependence theory) may be moderated by perceived environmental conditions, according to our line of reasoning. Therefore, a more complex explanation is needed and other hypotheses have to be tested in order to understand the role that resources and perceived environmental uncertainty interactively play in alliance formation (model 2).

Resources obtained through alliances help firms to overcome resource shortages or to take the most from market opportunities. Resource shortages are particularly pressing in uncertain environmental contexts and market opportunities tend to arise more frequently in stable environmental contexts. So, external situation determines the kind of alliance that is more probable to occur: an alliance to fill a resource gap or an alliance to enhance a resource advantage. Hence, external situation determines also the kind of firms that set alliances with a higher probability: resource-poor or resource-rich firms, respectively.

The use of the concepts of "exploitation alliance" and "exploration alliance" is useful at this point. Park *et al* (2002) define an "exploitation alliance" as a pull-oriented alliance, that is, "a need-based alliance to sustain a firm's survival", and an "exploration alliance" as a push-oriented alliance, that is, an alliance "to create new opportunities". The first type of

alliance tends to occur more frequently in contexts of high environmental uncertainty, when survival is the main objective of firms. When environmental uncertainty is not so high, this kind of alliances has a lower probability to arise because firms are more interested in taking advantage from the environment and the need to survive is less pressing. Alliances of the latter type, that is, "exploration alliances" are then more frequent. This is to say that the environmental context tends to determine the nature of the alliance.

Hence, environmental uncertainty determines also the type of firm more prone to settle alliances. Resource gaps and the need to survive are more frequent for resource-poor firms. As a consequence, resource-poor firms tend to engage more in alliances when environmental uncertainty is high (alliances enhance the short-term viability of these kind of firms) and less in relatively stable contexts. This is in accordance with the resource dependence theory. So, the hypothesis to test will be,

H2 – The probability of a firm entering into an alliance is negatively related to the number of resources it controls when the level of environmental uncertainty it perceives is high.

Resource advantages and the capability to take advantage from new opportunities characterize better resource-rich firms. This situation can not

be well understood using the resource dependence theory. In order to capture windows of opportunity, firms must be strong in internal resources, that is, they must be resource-rich, as postulated by the resource-based approach. Empirical results also support the view that these firms are more able to diversify products and activities (Gourlay and Seaton, 2004), creating new chances to ally.

Environmental opportunities are more probable to arise when uncertainty is not very high. As stated by Park *et al* (2002), "in a declining market, firms [that is, resource-rich firms] refrain from expanding or acquiring new resources, which further reduces opportunities for inter-firm collaboration". Following Park & Russo (1996), they argue that "any potential benefits of alliances would be offset by high costs and risks involved in setting up and managing strategic alliances". Hence,

H3 – The probability of a firm entering into an alliance is positively related to the number of resources it controls when the level of environmental uncertainty it perceives is low.

Summing up, the resource based view and the resource dependence theory have a strong explanation power for the behaviour of firms regarding strategic alliances. However, we contest the possibility of each one of these approaches being tested with models that do not allow for the interaction

between the level of environmental uncertainty and the number of resources firms control. Regarding the resource dependence theory, what is surprising is that albeit the importance that resources and uncertainty separately play in the framework, they do not act interactively to explain alliances. If they do, theoretical results would be somewhat different.

Thus, the conclusions of our integrative model support both the resource dependence theory and the resource-based view (table 1). The probability of a firm establishing an alliance rises when the number of resources it controls increases if perceived environmental uncertainty is not a serious constraint (the resource-based view). Otherwise, we have an inverse relationship (resource dependence theory).

[Insert Table 1. about here]

III. Data, econometric models and results

The data used in our models were collected through a survey made to a sample of Portuguese firms. The set of firms to be surveyed was selected from an official database (Base Belém) published by the Portuguese Statistical Institute (INE), containing the largest 10.000 Portuguese firms. In order to select the firms to be inquired, we used as criteria the sub-sector

of activity and the size of the firm. Concretely, we selected only firms belonging to 29 industrial sub-sectors and, within each sub-sector, the 50% largest ones. The number of firms enquired was 2751 and the number of respondent firms with complete data for estimation purposes was 310, of which 83 correspond to effective alliances.

The survey was put in place at the end of 1999 and was directed to the CEOs of the firms. Questions included the following categories: a) general information (sector of activity, size of the firm, year of establishment, R&D activities, level of internationalization); b) evaluation of the environmental context (market, technology and competition constraints); c) establishment of alliances with other firms during 1995-1999 and data related to them (main objective, number and nationality of partners, type of alliance).

In cases with no alliance, all data are for 1997. For firms with only one alliance created in the period 1995-1999, the data are for the year of the alliance. When two or more alliances were created in this period, we asked the CEOs to consider only the first one and to report all the relevant data for the year of the establishment of this alliance.

Table 2 shows descriptive statistics and the correlation matrix for the explanatory variables used in the econometric analysis.

[Insert table 2 about here]

The probability of alliance formation is modeled as:

Model 1:

$$P[alliance] = f(AGE, SIZE, EFF, PEU, NRES)$$

Model 2:

$$P[alliance] = g(AGE, SIZE, EFF, PEU, NRES, PEU^2, NRES^2, PEU \times NRES)$$

where *PEU* (perceived environmental uncertainty) and *NRES* (number of resources the focal firm controls) are the main variables, and *AGE* (age of the focal firm, in years), *SIZE* (size of the focal firm measured by number of employees), and *EFF* (efficiency of the focal firm measured by the ratio sales turnover / number of employees) are control variables. In both cases, a *logit* specification was adopted.

Before presenting the results of the two models, a more accurate explanation and justification of the independent variables are needed.

As regards *PEU*, we have taken into account that our sample mainly includes SMEs, though they are among the biggest Portuguese firms. Although this kind of firm may be just as sensitive to many types of

uncertainty as any other company, we expect their engagement in alliances to be especially sensitive to particular sources of uncertainty. So and following Burgers *et al* (1993), Dickson and Weaver (1997) and Sarkar *et al* (2001), we have considered technology, market and competition constraints as relevant sources of uncertainty for our sample of firms.

Technological complexity and volatility and increasing technological development costs threaten the relevance of existing competencies making alliances a source of advantages in the process of getting new technological knowledge. In the same way, demand uncertainty has been found to influence investment (Caselli *et al*, 2003; Price, 1996). In turbulent markets where customer needs evolve rapidly, collaboration helps firms to develop new products and services that satisfy emerging consumer needs and enhances their capacity to enter new markets and segments. As regards competition constraints, in rapidly changing competitive environments firms never know in advance whether or not their actions will invite retaliation or which moves by competitive rivals will bear a direct impact upon them (Burgers *et al*, 1993). In this situation, firms can improve their positions by creating new networks with new partners or maintain them by reinforcing existing relationships through additional alliances in order to increase entry barriers and reduce the level of competitive intensity (Sarkar *et al*, 2001).

Therefore, and in order to test the influence of environmental constraints on the propensity of firms to engage into alliances, we have used

a composed variable including items related to technology, demand and competition indicators. Each of these three items was expressed in a five-point response scale in order to assess manager perception of environmental constraints. Specifically, we asked CEOs to respond to what extent 1) the pace and complexity of contemporary technological developments, 2) consumer behavior and 3) the behavior of competitors, are constraining factors in the development of firm strategy. Then, for each firm we have calculated the simple average of the three results, thus obtaining a scale of 1 to 5 for our composite variable.

In order to evaluate the extent to which resources controlled by the firm are important for engagement in alliance strategies, we have considered five critical resources: the existence of R&D activities in the focal firm, access to technology and general know-how, experience in internationalization processes, access to financial resources and access to a specialized work-force. The first item was objectively measured (the firm develops or not R&D activities) and for the latter four we have used five-point scale perceived measures. For each of these latter four items, we calculated the simple average of all responses at the sector level, in order to take into consideration sectoral specificities. Accordingly, we considered as weak those cases with worst situations than the sector average and as strong all other cases. The variable measuring resource strength was then graduated from 0 (the focal firm is weak in all items) to 5 (the focal firm is strong in all items).

While our explanatory variable NRES measures internal resources, the variable PEU is linked to external conditions. As we can see in table 2, the correlation coefficient between these two variables is negative and equal to -0.32.

The choice of control variables (*AGE*, *SIZE* and *EFF*) aims to incorporate into the models the variables most often used in other studies[2]. We do not expect specific results for these variables because the extant literature is not consensual in this field.

Summing up, the two models differ, not in their original explanatory variables (exactly the same in both models) but in the way they combine to produce results and test hypotheses. In model 1, no interaction between independent variables is assumed. In model 2, we let perceived environmental uncertainty and the number of resources interact and we admit a non-linear relationship between the probability of alliance formation and each of these independent variables.

Our expectation is that model 1 will produce increasing probabilities of alliance formation with the increase of *PEU* (hypothesis *H1*). As regards model 2, and having in mind *H2* and *H3*, our expectation is that the probability of alliance formation will increase with the rise in *PEU* (*NRES*) for low levels of *NRES* (*PEU*) and decreases with *PEU* (*NRES*) for high levels of *NRES* (*PEU*).

[2] See, for example, Bishop (2003), Gomes-Casseres (1997), Rothweel (1983), Moenaert *et al* (1990), Steensma *et al* (2000), Foster and Meinhard (2002), Baum and Oliver (1991), Stuart *et al* (1999), Levitt and March (1988), Burgers *et al* (1993), Park *et al* (2002).

Results of model 1 support *H1* (table 3). The coefficient of *PEU* is positive and statistically significant. Regarding the variable *NRES* we see that the coefficient is also positive and statistically significant. This means that the probability of a firm entering into an alliance increases with the level of environmental uncertainty it perceives and the number of resources it controls.

The probability of alliance formation for all levels of *PEU* and *NRES* can be calculated using the results of model 1 (table 4). With a level 1 of perceived environmental uncertainty, the probability of a firm entering into an alliance when it controls none of the included resources is 1.45%. The probability rises to 88.9% when we consider a firm that controls all the five resources considered and has a level 5 of perceived environmental uncertainty.

In general, the results are in accordance with the predictions of the resource-based view, independent of the level of perceived environmental uncertainty. However, we can see that low levels of environmental uncertainty produce lower probabilities of alliance formation, regardless of the number of resources the firm controls. This already serves as a first indication that environmental conditions matter in the behavior of firms.

[Insert Table 3. about here]

[Insert Table 4. about here]

[Insert Table 5. about here]

Results of model 2 also corroborate our expectations (table 3). All the estimated coefficients for the main variables are statistically significant. In particular, we obtained negative estimates for the coefficients of *PEU*-squared and *NRES*-squared, indicating an inverted U-shaped relationship between the probability of alliance formation and the level of perceived environmental uncertainty, on the one hand, and this probability and the number of resources, on the other. This means that alliance events seem to be more common for conjointly intermediate values of these variables than for the conjointly extreme values. The interaction term is also significant indicating strong crossed effects of the two explanatory variables on the probabilities of alliance formation.

Both in models 1 and 2, the high value of the likelihood ratio (LR) rejects the hypothesis of joint exclusion of all the explanatory variables. Furthermore, the joint exclusion of the additional variables in model 2 is clearly rejected by the data (the value of the LR test statistic is 27.0, quite above the critical value of 7.81 corresponding to a $\chi^2_{(3;0.05)}$), thus giving a clear preference for this model when we confront it with model 1.

The estimated probabilities (table 5) show that for the first three levels of perceived environmental uncertainty, the probability of alliance formation increases with the number of resources in accordance with the resource-based view. Conversely, for the highest levels of that variable, the probability of an alliance event tends to decrease with the number of

resources controlled by the firm. Thus, as expected, the resource-based view holds for low levels of environmental uncertainty and the resource dependence theory can be applied when firms face sharply adverse external conditions.

IV. Conclusions

The resource dependence theory and the resource-based view both emphasize the role of internal resource conditions on inter-firm alliance formation. The first one is more appropriate to explain cooperation involving resource-poor firms while the latter is more adequate to understand alliances between resource-rich ones. The main contribution of this article is to show that these results are contingent on environmental uncertainty perceived by firms. So, we let resource conditions and perceived environmental uncertainty interact in order to fully assess their impact on the probability of firms to engage in alliances.

We have argued that for high levels of perceived environmental uncertainty, resource-rich firms are not predisposed to collaborate because the costs of collaboration are greater than the potential benefits. Despite of also suffering from high collaboration costs, resource-poor firms have no viable alternative and prefer to support the costs of collaboration rather than perish. Hence, volatile environmental conditions are more prone for the

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establishment of alliances involving resource-poor firms than that involving resource-rich ones.

Even if environmental conditions are not particularly constraining, firms may still experience a high desire to collaborate. However, the resource-poor encounter difficulty in finding potential partners because they have no relevant resources to share. This makes the cost of collaboration very high because partners can impose unacceptable conditions in a context where the survival of the firm is not threatened. These firms then show a low propensity to ally. On the contrary, resource-rich firms are interesting partners in a context where the benefits of allying exceed the costs. Therefore, for low levels of environmental uncertainty, alliances are mainly developed by this kind of firms and "exploration" alliances are particularly relevant in this context.

Our empirical results support the theoretical arguments. Confronting the estimates obtained with models 1 and 2, the data give a clear preference to the model with interaction between resources and environmental uncertainty. That is, the impact of resources on alliance activity is moderated by perceived uncertainty. In fact, table 5 shows that, for high levels of environmental uncertainty, the probability of alliance formation tends to be negatively related to the number of resources a firm controls, a result that is in accordance with our hypothesis *H2*. For low levels of uncertainty, the probability of alliances increases with the number of resources, in line with our hypothesis *H3*.

These results contrast with those of Park *et al* (2002), although they work with a different concept of uncertainty and use only star-up firms in the semiconductor industry. In our case, we used data concerning 29 industrial sub-sectors. Sectoral specificities are partially taken into account by the way we defined the resources variable. It would be interesting to further differentiate between sectors and also particular types of alliances. However, the limited number of alliances in our database does not allow us to exploit this type of analysis.

So, the main conclusion of this paper is that the resource-based view holds for low levels of perceived environmental uncertainty whilst the resource dependence theory fits better to severe adverse conditions. Our interpretation is that, in the first case, alliances are mainly explained by the capacity to find partners, that is, by the availability of internal resources. In the second case, they are activated by a lack of resources and the fear of bankruptcy within a context of great environmental uncertainty.

References

Arndt, J. (1979) Towards a concept of domesticated markets, *Journal of Marketing,* **43**, 69-75.

Barley, S. R., Freeman, J. and Hybels, R. C. (1992) Strategic alliances in commercial biotechnology, in *Networks and Organizations* (Eds) N. Nohria and R. Eccles, Harvard University Press, Cambridge, MA, pp. 311-347.

Baum, J. A. and Oliver, C. (1991) Institutional linkages and organizational mortality, *Administrative Science Quarterly*, **36**(2), 187-218.

Beckman, C. M., Haunschild, P. R., and Philips, D. J. (2004) Friends or strangers? Firm-specific uncertainty, market uncertainty, and network partner selection, *Organization Science*, **13**(3), 259-275.

Bishop, Paul (2003) Collaboration and firm size: some evidence from the UK defense industry, *Applied Economics*, **35**, 1965-1969.

Burgers, W. P., Hill, C. W. L. and Kim, W. C. (1993) A theory of global strategic alliances: the case of the global auto industry, *Strategic Management Journal*, **14**, 419-432.

Caselli, P., Pagano, P., and Schivardi, F. (2003) Uncertainty and the slowdown of capital accumulation in Europe, *Applied Economics*, **35**, 79-89.

Child, J. and Faulkner, D. (1998) *Strategies of Co-operation: Managing Alliances, Networks, and Joint Ventures,* Oxford University Press, Oxford.

Das, T. K. and Teng, B. (2000) A resource-based theory of strategic alliances, *Journal of Management*, **26**(1), 31-61.

Dickson, P. H. and Weaver, K. M. (1997) Environmental determinants and individual-level moderators of alliance use, *Academy of Management Journal*, **40**(2), 404-425.

Dussauge, P. and Garrette, B. (1999) *Cooperative Strategy. Competing Successfully Through Strategic Alliances*, Wiley & Sons, New York.

Faulkner, D. and De Rond, M. (2000) *Cooperative Strategy. Economic, Business, and Organizational Issues*, Oxford University Press, Oxford.

Foster, M. K. and Meinhard, A. G. (2002) A regression model explaining predisposition to collaborate, *Nonprofit and Voluntary Sector Quarterly*, **31**(4), 594-564.

Gourlay, A and Seaton, J. (2004) The determinants of firm diversification in UK quoted companies, *Applied Economics*, **36**, 2059-2071.

Gomes-Casseres, B. (1997) Alliance strategies of small firms, *Small Business Economics*, **9**, 33-44.

Kogut, B. (1988) Joint ventures: theoretical and empirical perspectives, *Strategic Management Journal*, **9**, 319-333.

Levitt, B. and March, J. G. (1988) Organizational learning, *Annual Review of Sociology*, **14**, 319-340.

Milliken, F. J. (1987) Three types of perceived uncertainty about the environment: state, effect, and response uncertainty, *Academy of Management Review*, **12**(1), 133-143.

Moenaert, R. K., Deschoolmeester, D., De Meyer, A., and Barb, J. (1990) Organizational strategy and resource allocation for technological turnaround, *R&D Management*, **20**(4), 291-303.

Park, S. H., Chen, R. and Gallagher, S. (2002) Firm resources as moderators of the relationship between market growth and strategic alliances in semiconductor start-ups, *Academy of Management Journal*, **45**(3), 527-545.

Park, S. H. and Russo, M. (1996) When competition eclipses cooperation: an event history analysis of joint venture failure, *Management Science*, **42**(6), 875-890.

Pfeffer, J. and Nowak, P. (1976) Joint ventures and interorganizational interdependence. *Administrative Science Quarterly*, **21**, 398-418.

Pfeffer, J., and Salancik, G. R. (1978) *The External Control of Organizations: A Resource Dependence Perspective*, Harper and Row, New York.

Price, Simon (1996) Aggregate uncertainty, investment and asymmetric adjustment in the UK manufacturing sector, *Applied Economics*, **28**, 1369-1378.

Robertson, T. S. and Gatignon, H. (1998) Technology development mode: a transaction cost conceptualization, *Strategic Management Journal*, **19**(6), 515-531.

Rothwell, R. (1983) Innovation and firm size: the case of dynamic complementarity, *Journal of General Management*, **8**(6), 5-25.

Sarkar, M. B., Echambadi, R. and Harrison, J. S. (2001) Alliance entrepreneurship and firm market performance, *Strategic Management Journal*, **22**, 701-711.

Steensma, H. K., Marino, L. and Dickson P. H. (2000) The influence of national culture on the formation of technology alliances by entrepreneurial firms, *Academy of Management Journal*, **43**(5), 951-973.

Stein, J. (1997) On building and leveraging competencies across organizational borders: A socio-cognitive framework, in *Competence-Based Strategic Management* (Eds) A. Heene and R. Sanchez, Wiley, Chichester, pp. 267-284.

Stuart, T. E., Ha, H. and Hybels, R. C. (1999) Interorganizational endorsements and the performance of entrepreneurial ventures. *Administrative Science Quarterly*, **44**(2), 315-349.

Williamson, O. E. (1979) Transaction cost economics: governance of contractual relations, *Journal of Law and Economics*, **22**(1), 233-261.

Table 1. Probabilities of alliance formation

		Number of resources		Approach
		Low	High	
Level of environmental uncertainty	Low	LOW	HIGH	Resource-based view
	High	HIGH	LOW	Resource dependence theory

Table 2. Mean values, standard deviations and correlation matrix for the explanatory variables in models 1 and 2

	Mean	Std Dev	Correlation coefficient				
			AGE	SIZE	EFF	PEU	NRES
AGE	29.4	24.0	1.00				
SIZE	391	1417	-0.09	1.00			
EFF	21.7	60.9	-0.05	0.03	1.00		
PEU	3.04	0.73	0.01	-0.16	0.03	1.00	
NRES	2.31	1.32	0.02	0.18	0.14	-0.32	1.00

Table 3. Econometric results

Variable	Model 1 Coefficient	Model 1 Standard-error	Model 1 *p*-value	Model 2 Coefficient	Model 2 Standard-error	Model 2 *p*-value
Constant	-6.289	.9763	.000	-29.95	6.488	.000
AGE	.0191	.0056	.001	.0210	.0063	.001
SIZE	.00037	.00019	.050	.00051	.00026	.053
EFF	.00002	.000008	.013	.000015	.000009	.097
PEU	.9161	.2308	.000	10.39	2.848	.000
NRES	.5282	.1298	.000	6.705	1.557	.000
PEU^2				-.8456	.3340	.011
$NRES^2$				-.2493	.1092	.022
*PEU*NRES*				-1.465	.3331	.000
N	310			310		
Log-likelihood	-145.3			-131.8		
LR	69.6			96.65		
% of correct predictions	77.7			78.7		

Table 4. Probabilities of alliance formation – model 1

		Number of resources					
		0	1	2	3	4	5
Perceived environmental uncertainty	1	0.0145	0.0243	0.0405	0.0669	0.108	0.171
	2	0.0354	0.0586	0.0955	0.152	0.233	0.340
	3	0.0841	0.135	0.209	0.309	0.432	0.563
	4	0.187	0.280	0.398	0.528	0.655	0.763
	5	0.364	0.493	0.623	0.737	0.826	0.889

Estimates based on mean values for the control variables

Table 5. Probabilities of alliance formation – model 2

		Number of resources					
		0	1	2	3	4	5
Perceived environmental uncertainty	1	.0000	.0000	.0000	.0031	.0915	.6680
	2	.0000	.0004	.0077	.0882	.4240	.7730
	3	.0052	.0393	.1630	.3610	.4980	.5140
	4	.3120	.4510	.4750	.3770	.1970	.0572
	5	.8790	.7530	.4370	.1070	.0111	.0006

Estimates based on mean values for the control variables